

The Internet as a Resource for Physics

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I. Catching up

If you were unable to complete last week's assignment, please finish the first assignment today. As a reminder, you need to type a piece of scientific text using the Microsoft equation editor in Microsoft Word, print it, and turn it in to Anand. There were a number of problems with printing last week. Also, you need to send an email message to Anand with a carbon copy to me. I have only received 7 messages so far. Ten messages are still missing in my mailbox. If you would like to double-check that both Anand and I received your message, please ask. Finally, you need to turn in a piece of paper (in lieu of a log book, which you may not have had last week) explaining the amount of work you did, where you succeeded and where you had problems.

About printing: Last week, some of you had problems with printing your work. We have made hardware and software improvements since then, and printing from all computers was tested. I hope that things work better now. We still may need to fine-tune the time-out settings on the new boxes. Please bear with us while we are making improvements to serve you better. If you still have trouble printing, please save your file on a floppy and try printing from a different computer.

No matter how much experience you have with computers, things always go wrong. Computers always seem to break as soon as I touch them. If you have the same experience, don't panic. Just yell for help.

Starting with next week's lab, you should be familiar with basic Windows operations, DOS and Vincent commands. If you need to catch up, do it now. Next week, you will have to focus on numerical problems and you should not be hindered by lack of experience with Windows.

II. Objective

To explore the Internet as a resource for physics research and education. Today's work will focus on the use of an Internet browser (Netscape), will show you where to find a useful book on-line, and will give you the opportunity to explore physics related sites on the Internet.

III. Introduction

A **network** is a collection of individual computers that share information. The **Internet** is an affiliation of tens of thousands of private, commercial, academic, and government supported networks in more than 80 countries. With the Internet, one can locate many items useful for

physics research and education or for personal entertainment: current research information, reference documents, and software. On the other hand, there is also much on the Internet that is absolutely worthless (or obscene or illegal).

There are several useful aspects of the Internet that we have already used. These are:

- **Newsgroups:** a forum (world-wide or institution-wide) where people with common interests may share information.
- **File Transfer Protocol (ftp):** an Internet application that allows one to transfer files from a remote computer to your own computer.
- **Telnet:** an Internet application that lets one connect to remote computers and run programs or browse through information.

Today we will explore two new parts of the Internet, defined below:

- **Gopher:** an Internet system that allows one to locate and retrieve files and documents (with the arrival of WWW, gopher is about to die, but you can try using it anyway).
- **World Wide Web (WWW):** an Internet-based system that allows one to jump from one document to another, from one computer to another, simply by clicking icons and highlighted text called **hypertext**. Hypertext points to other related information using addresses called **uniform resource locators (URL)**.

A **browser** is a program that allows you to locate information and go to sites on the Internet. We will use a browser called **Netscape**. Other browsers are Mosaic, Microsoft's Internet Explorer, or IBM's WebExplorer. On-line services, such as America Online, have proprietary browsers that can also be used to surf the Internet.

There are also other Internet applications that we will not discuss, such as video and telephone links, X-windows, and NFS and AFS file systems.

All of the applications above use TCP/IP, a public-domain protocol format, to transfer information. There are also proprietary protocols, such as Novell Netware, Lotus, Microsoft Windows for Workgroups, DECNET, Pathworks, or IBM Peer.

IV. Exercises

A. Getting Started with Netscape

Objective:	to gain experience in using Netscape
Where to begin:	start in MS Windows and double-click on the Netscape icon
What to do:	use Netscape to perform the operations below
What to turn in to your instructor:	nothing
What to put in log book:	the time you begin your work, problems, solutions, new commands, etc.

(1) **Going to a known site:** use the **File** menu and the **Open Location** button, then specify one of the following URLs to go to a specific site:

Uniform Resource Locator (URL)	What's there
http://www.amherst.edu/~ajp/	American Journal of Physics Homepage
http://www.nrel.gov/	Renewable Energy Lab Information
http://femto.ssp.ameslab.gov	Stefan Zollner's page (including PHY 232 home page). Follow some of the links you find interesting.
http://www.public.iastate.edu/~physics/	ISU Physics Homepage

(2) **Searching for an unknown site:** use the **Net Search** button and the appropriate search words to locate an item. For example, locate Parks Library's Scholar system by searching relevant key words (Scholar, Iowa). Once you find Scholar, connect to the on-line catalog (ICAT) and check to see if either of your instructors has published anything Park's Library deemed worth saving.

(3) **Viewing what you have done:** view a list of all the places you have visited on the web so far by clicking the menu **Go** and the submenu **View History**. You should see a list of sites you have been through in this session. Click the **OK** button to quit.

(4) **Saving the location of a site:** save the location of ICAT for later use by going to the menu **Bookmark** and clicking **Add Bookmark**. Once an address is added to the list of bookmarks, one may access it immediately by entering the **Bookmark** menu and clicking the title of the desired bookmark. Check this to make sure it works.

(5) **Moving forward and backward:** click the button **Back** and note that it takes you to your previously visited web site. Pushing the **Forward** button then returns you to your starting point. Try to follow some of the links to other sites from the **PHY 232 homepage**, for example to the American Institute of Physics or the journal **Computers in Physics**.

(6) **Other Buttons:** explore buttons you are not familiar with and make note of what they do and where they take you.

(7) **Other search programs:** explore the various search programs available such as **Yahoo**, **Lycos**, **Webcrawler**, etc. These all do what the **Net Search** button on Netscape does, but they each search in a different way. These search routines may also be found on the ISU homepage.

B. Reading Numerical Recipes

Objective:	to read section 4.1 of <i>Numerical Recipes</i> (this section is about numerical integration, and we will use it next week)
Where to begin:	in Netscape
What to do:	search the web for the book and then read section 4.1 and print out the first 3 pages
What to turn in to your instructor:	nothing
What to put in log book:	the time you begin your work, problems, solutions, new commands, etc.

(1) *Numerical Recipes* is a beautifully written book that covers all aspects of computational methods of interest to us in this course, and more. It cost me \$45 five years ago, but you can access it for free through the Internet. First search for the book by title (*Numerical Recipes in FORTRAN*). This will probably lead you to the **Numerical Recipes Homepage**, after which you should click on **Books On-line** and then look around until you find the **On-Line in Adobe Acrobat** heading.

(2) Read Section 4.1 on techniques of numerical integration. To do this, click on the icon by the section number. A program called **Adobe Acrobat** should begin, and after a few seconds (if you are lucky) you will see the text.

(3) Print out the first three pages (please do not print out all eight pages). Do this just as you would in MS Word (ask if you need help).

Note: this exercise is our best example of useful information on the Internet. The viewing software Adobe Acrobat is public domain, and was down-loaded from the web by your instructors and installed on your machines. We would have liked to let you do this yourself, but to save time we did it for you.

C. Physics Resources

Objective:	help us put together a list of sites useful for physics research and education
Where to begin:	in Netscape
What to do:	search the web for books, software, and information you would consider useful for physics and for this course
What to turn in to your instructor:	a 1-2 page, single-spaced report, written with a partner, summarizing your findings and your overall opinion of the Internet
What to put in log book:	anything useful you find

(1) Find a partner. Together you and your partner should put together a list containing URLs, an explanation of where they take you, and why you think these sites are valuable. For example, you might search for:

- information related to future topics we will study in this course (**MS Excel, Maple, LabVIEW**). Is there any free software available?
- information related to an area of physics you are interested in (**Condensed Matter Physics, High Energy Physics, etc.**)
- Search the names of a few national laboratories as **Argonne, Ames Lab, Brookhaven, Lawrence Livermore, etc.** and explore the information they offer. Take good notes on what you find to be useful.

(2) Write a 1-2 page report, single-spaced, with the help of your partner. Include the URLs for at least five Internet sites where you found information useful for physics research or education. Write your report in MS Word, call it **report1.doc**, and save it on your diskette in the **A:** drive (ask if you have questions about this). Note that you may run Netscape and Word simultaneously, and that you may switch back and forth between them by simultaneously pressing the **ALT** and **TAB** keys.

(3) Print your report (keep your fingers crossed) and sign it with your names.

D. Check the Physics 232 Locker

If you have not already done so, check to see that you have been given access to the Physics 232 locker on Vincent. The instructions for this were posted in the Physics 232 newsgroup on Monday, which you may read through Netscape. Follow the instructions there, and inform your instructors if you cannot access the locker. Write down the names of a few of the files in the locker and add them to your log book.

E. Log book

If you have any time left over, work on your log books. For this course, we will ask that you try to record anywhere from 5 to 10 log book entries. Follow the format outlined in the syllabus. We hope that these materials will be of value to you after you finish this course.

V. Where to go from here

Would you like to install Netscape and other TCP/IP applications on your own computer?
Would you like to connect to an on-line service or the internet using a modem?
Do you want to configure your browser to view other types of documents (such as MS Word files, postscript files, DVI files, PCX images, or MPEG movies)?

If you have questions such as these, we will be happy to discuss them with you, based on your computer setup (hardware, operating system, and telephone service) at home.

VI. If you're still bored ...

... read in the Numerical Recipes book and see what you can learn about

- Numerical differentiation,
- Numerical integration,
- Root solving (secant method)

... see what you can find out about Maple or Mathematica on Project Vincent.

VII. About next week's lab

Next week, we will use Microsoft Excel (a spreadsheet program), to solve numerical problems: Differentiation, integration, root solving, etc. If you are not familiar with spreadsheets such as Excel, please practice before coming to class on Friday. Otherwise, Friday's unit will feel like drinking from a fire hose. You should know about cells and formulas and how to cut, paste, and fill.